

## Original Paper

# The Problem and Adjustment of the Unbalanced Allocation of Compulsory Education Resources: Evidence from Chongqing

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### Abstract

*In order to narrow the gap in compulsory education resource distribution among districts and counties, and promote equity in education among regions. This article analyzes the current situation and causes of the unbalanced allocation of compulsory education resources in Chongqing and proposes the existing problems. Through the use of statistical description and spatial autocorrelation methods to analyze the internal relations of related factors and variables. And on the basis of proving the existence of proximity, it analyzes the type and influence mechanism of regional aggregation in the process of unbalanced allocation of compulsory education resources. This article focuses on constructing the theory of non-equilibrium allocation of compulsory education resources in Chongqing, proposing the basic assumptions of compulsory education resource allocation research, analyzing the problems of spillover effect, convergence effect, demonstration effect, etc. The theoretical hypothesis of the unbalanced allocation of educational resources is empirically tested.*

### Keywords

*non-balanced education resources, spatial econometric, spillover effects*

## I. Introduction

Since the reform and opening up, China has continuously increased investment in education finance, and education has developed rapidly. However, there is a clear gap between the development speed and growth level of education in various regions, which has become one of the important topics discussed by the education community. The reason for the development of the western region is that the state's investment in Chongqing's education finance has increased year by year, but the increase in the total amount does not mean that the difference between the districts and counties of Chongqing has narrowed. The imbalanced economic development of various regions will inevitably cause

interregional investment serious imbalances, which are bound to cause inequality in educational development opportunities between regions. This situation is contrary to the principles of equal educational opportunities and fair social benefits.

Compulsory education resource allocation is an important issue in the research of education finance. Compulsory education resource allocation is the phenomenon of resource allocation differences in different regions, different education levels, and different social groups that are displayed in the interaction between education and social, economic, and political factors. This complexity and dynamics, on the one hand, pose challenges to the practice of public financial management, on the other hand, it is also constantly intriguing scholars' thinking and research interest. This research makes some attempts and explorations on this topic.

In the study of compulsory education resource allocation, how to measure the balance degree of compulsory education resource allocation is an important issue. Textual description research was once the mainstream, and with the advancement of science and technology, the continuous innovation of computing tools and research methods, the way to describe the allocation of compulsory education resources has gradually changed from a textual description to a mathematical method to establish quantitative indicators. Such as range or grade difference rate, coefficient of variation, etc. Therefore, how to measure the distribution of compulsory education resources spatial distribution more directly is one of the important purposes that this study attempts to analyze.

To explore the allocation of compulsory education resources and their spatial distribution in a specific space-time scale, it is not difficult to find that the spatial distribution of compulsory education resources is restricted by environmental factors such as social, economic, and political factors, for example, the insufficient investment of education finance in the western region obviously, it is limited by the relatively backward economic development level of the local area. Under the premise of low economic development level, local financial sources are few and there is not enough ability to increase investment in education. In addition, the allocation of resources for compulsory education is also restricted by factors such as politics. For example, the western development policy has enabled the western region to obtain a lot of central financial support. It can be seen that the spatial aggregation degree, imbalance degree and location change of compulsory education resource allocation indicate that the social, economic and political environment within or outside the region has changed to some extent, resulting in a balanced degree of compulsory education resource allocation and the transformation of intensiveness. This research hopes to put forward the theoretical system of Chongqing's compulsory education resource allocation and conduct an empirical test through the construction of resource allocation system theory and the spatial measurement analysis of unbalanced allocation, so as to provide more abundant information for Chongqing's compulsory education resource allocation research.

## 2. Literature Review

The allocation of compulsory education resources refers to the distribution of compulsory education resources at all levels and localities. It is a multi-level and multi-regional distribution choice for compulsory education resources in order to find higher efficiency and effectiveness and the balanced and comprehensive development of education. It is the country and governments at all levels. Of course, with the reform of the economic system and the improvement of marketization, the influence of the market and society on the allocation of compulsory education resources is gradually increasing. In the process of compulsory education resource allocation, there is often a resource aggregation effect, which is one of the manifestations of imbalanced compulsory education resource allocation.

Studies by Zeng Manchao and others show that the utilization and allocation of compulsory education resources in China are very uneven, and the level of expenditure per student varies greatly between regions, especially between rural and urban areas, and between coastal provinces and other regions very obvious. The unbalanced expenditure per student in elementary school and junior high school is very high. Yang Dongping's research found that compulsory education resources are concentrated in key high schools, and there is an obvious urban-rural duality. The non-primary and key dualistic school compulsory education resource system has widened the social class gap. Peng Zeping's research shows that there is a clear gap between the development of higher education in the east and the west of China, and its development will surely aggravate the imbalance in the development of the east and the west and affect the coordinated development of the economy and society in the east and the west. Empirical studies by scholars such as Wang Maishan indicate that the regional differences in my country's education expenditure do show an upward trend. Different scholars also explain the imbalance of China's compulsory education resource allocation from different perspectives. Wei Houkai and Yang Dali pointed out that the unbalanced development of the regional economy after the decentralization reform will inevitably cause a serious imbalance in the investment in education between regions, and this imbalance will inevitably lead to inequality in educational development opportunities between regions. For this reason, it is necessary for the central and provincial governments to balance the education finance between regions by some means, so as to gradually narrow the differences in education development between regions.

Gu Jiafeng studied the spatial distribution of China's 2000 compulsory education resource allocation, and divided it into four ethnic groups from the national spatial scale according to the LISA method, namely HH ethnic group, LH ethnic group, LL ethnic group, HL ethnic group, and discussed the different Comparison of features between clusters and comparison of features within the same cluster. Research shows that China's compulsory education resource allocation is characterized by expansion, concentration or multi-core. There are obvious differences in the compulsory education resource allocation in different regions. There is an unbalanced situation of "the rich get richer, the poor get poorer", and the spatial distribution Show obvious spatial heterogeneity. Through the analysis of spillover effects, we explored the urban allocation of compulsory education resources and found that

the effects of economic agglomeration, financial resource agglomeration and population migration agglomeration on the spatial agglomeration of compulsory education resources are all positive and significant, and the empirical test of the spillover effect, and it is not a virtual or imaginary relationship, but an objectively existing connection in reality. In the actual relationship, mutual influence is a dynamic process, and the causal cycle continues. The spillover effect causes the cause and effect to change continuously, resulting in the formation of mutual spillover. Education plays a vital role in the development of a country. All countries are investing more in education to enhance national human resources. China has developed education on a very weak basis, but has achieved remarkable results. In the course of educational development, Chinese provinces have also exposed some problems, one of which is the uneven development of education among regions. Because education has the nature of public service and is an important system for achieving social equity, the balanced development of education in various regions is one of the important indicators for achieving education goals.

From a national perspective, there are relatively few studies on the unbalanced allocation of compulsory education resources. Most of the methods used are qualitative theoretical studies with strong theoretical foundations, but relatively few empirical studies. The data statistics and quantitative analysis of the balanced allocation of compulsory education resources is still a relatively new method, especially the construction of the theory of compulsory education resource allocation system and the method of spatial econometric analysis. From the perspective of Chongqing, there is a large regional gap in the non-equilibrium allocation of compulsory education resources, insufficient investment in education, and imbalanced allocation of compulsory education resources. Therefore, this paper analyzes the status quo and problems of Chongqing's compulsory education resource allocation, builds a model based on the theory of compulsory education resource allocation, and uses spatial econometric analysis methods to analyze the distribution of Chongqing's compulsory education resource allocation, spillover effect analysis, Resource demand analysis and convergence test, etc. Finally, improve and improve the model, analyze the problem and put forward relevant countermeasures and suggestions.

### **3. Research on the Distribution of Compulsory Education Resources Allocation in Chongqing**

In order to examine the spatial aggregation characteristics of compulsory education resource allocation, it is necessary to analyze the spatial distribution of compulsory education resource allocation. Generally speaking, the higher the degree of non-equilibrium allocation, the more obvious the tendency to gather toward the center in geographic space. Therefore, whether there is a feature of the development of Chongqing's compulsory education resource allocation towards the center is an important content to explore the unbalanced characteristics of Chongqing's compulsory education resource allocation, and also an important part of analyzing the compulsory education resource allocation mechanism. This chapter uses the 2017 county-level education investment and economic, social, and demographic data of Chongqing urban areas to calculate the spatial autocorrelation of compulsory education resources through spatial dependency analysis, analyzes the status of spatial

clustering, and discusses the basic causes of clustering development.

### *3.1 Data Collation and Description*

Research on the non-equilibrium allocation of compulsory education resources in Chongqing is based on several basic assumptions. The process of theoretical construction, which is set up process assumptions. Assuming that there are connections between different concepts and under what conditions, they need to pass empirical tests to be persuasive. Before testing, you need to have a preliminary analysis of the data and a basic understanding of the distribution characteristics of the data. What kind of data is used is mainly determined by the research purpose, and it is also limited by the research methods and models. In order to Chongqing Municipal Education Resource study non-equilibrium configuration, and examine the effect of geographical proximity effects and mechanism of resource allocation of financial education, empirical test of this paper, using a county-level data level. Using county data on grade level, for the following reasons:

It can analyze the allocation of compulsory education resources in various districts and counties in Chongqing from a global perspective, and then discover the clustering characteristics and geographical proximity characteristics of compulsory education resource allocation. On financial education resource decisions, especially financial education funding, county-level governments have a great responsibility and authority, its policies will directly affect the region's Education Resource degree as well as the development of investment in education, therefore, has a very strong research significance. Near the county information dissemination mechanism between relatively smooth, therefore, each county policy between interactions are relatively frequent, easy to observe and study.

Education funding of county-level data from the level of "Chongqing Statistical Yearbook 2018". In this study, by focusing on the 2017 Point in time, to observe the Chongqing Municipal Education Resource degree of variability and spatial structure and configuration of the county if there is aggregation or spill situations grade, then analyze the compulsory resources geospatial feature configuration, Provide clues for further testing.

In the analysis of the demand for compulsory education resources, education expenditure, total demand for education funding, GDP per capita, living area per capita, minority population ratio, non-agricultural population ratio, immigrants from other provinces, fiscal expenditure, resident savings, bank loans, Factors such as total industrial output value and investment amount.

### *3.2 Types of Spatial Aggregation of Compulsory Education Resource Allocation*

The diversity of compulsory education resource allocation cluster is one of the characteristics of cluster level. The diversity of clustering reflects the richness of clustering in the allocation of compulsory education resources, and it is usually only used for analysis at the regional scale. Combined with regional spatial self-correlation analysis (LISA), we can obtain four clusters of compulsory education resource allocation, which are: (1) H-H ethnic group, which represents the districts and counties that are clustered for the same education investment and have high education investment Surrounded by districts and counties with high investment in education. (2) The L-H ethnic group, which represents

the aggregation of different educational investments, the districts and counties with low educational investment are surrounded by the districts and counties with high educational investment. (3) The H-L ethnic group, which represents the aggregation of different educational investments, the districts and counties with high educational investment are surrounded by the districts and counties with low educational investment. (4) The L-L ethnic group, which represents the aggregation of the same education investment, the districts and counties with low education investment are surrounded by the districts and counties with low education investment. Among them, H-H and L-L represent positive spatial self-correlation, and L-H and H-L represent negative spatial self-correlation. These four kinds of aggregation reflect the spatial dependence of compulsory education resources, and also the concrete manifestation of the role of the established mechanism in the process of compulsory education resource allocation.

### *3.3 Comparison between Different Groups*

The unbalanced characteristics of compulsory education resource allocation can be confirmed from the regional analysis of the total compulsory education resources. There are 7 districts and counties in the L-L area, 5 districts and counties in the L-H area, and 4 districts and counties in the H-L area. There are no spatial dependencies between the 14 districts and counties and neighboring districts and counties.

The reasons for the unbalanced allocation of compulsory education resources in Chongqing are: first, the different natural conditions, historical basis, cultural differences, economic differences, and other objective reasons; and second, the system of the central government, provincial governments, and local governments. Policy reasons; the third is the role of proximity effect.

The above reasons form different types of aggregation in the process of compulsory education resource allocation, and the distribution of these aggregations is affected and restricted by various local environments. This imbalance in the total allocation of compulsory education resources is a basic feature of the total allocation. In order to achieve the balance of compulsory education resource allocation, the state will inevitably adjust and control the total allocation to ensure certain differences. Reflecting regional differences, at the same time, it will avoid excessive differences to avoid imbalances in the development of regional education.

**Table 1. The Characteristics of Different Ethnic Groups in Chongqing's Compulsory Education Resource Allocation**

Ethnic type	countries	proportion	Mean	Str. error	Max	Min
No spatial autocorrelation group	14	36.84	4308.2	2215.02	1767	27660
H-H	8	21.05	6459.8	6864.15	7666	59868
L-L	7	18.42	2155.21	1382.48	169	6953
L-H	5	13.16	2428.97	1572.29	1949	6249
H-L	4	10.53	4340	1391.31	5995	12196
total	38	100	18010.48	54476.25	197	56968

According to Table 1, we find that the HH ethnic group has the most abundant compulsory education resources, with the average education investment reaching 6459.80 thousand yuan; followed by the HL ethnic group, whose average education input reaches 43.40 million yuan, and the third is the space-free self-related ethnic group, whose average education input Reached 4308. 2 thousand yuan; the fourth is the LH ethnic group, the average investment in education reached 2428.97 thousand yuan; the lowest is the LL ethnic group, the average educational investment reached 2155.21 thousand yuan. It can be seen that different ethnic groups represent the distribution of compulsory education resources with different degrees of abundance.

#### 4. Convergence Effect of Compulsory Education Resource Allocation in Chongqing

In the process of resource allocation for compulsory education, we need to balance efficiency and fairness. This requires us to carry out research from a dynamic perspective. The method of research process analysis emphasizes long-term observation and trend analysis. Using the dynamic analysis of the compulsory education resource allocation process to determine whether the efficiency and public goals have been effectively implemented and to what extent, this requires us to test the hypothesis of the convergence of compulsory education resource allocation.

Explore whether the allocation of education financial resources in various regions of Chongqing has converged. That is, regions with higher education financial resources have a slower growth in investment in education financial resources, while regions with lower education financial resources have a faster investment in education financial resources. The difference gradually narrowed, and finally showed a balanced state.

#### 4.1 Model

$$\ln\left(\frac{Y_{i,t+k}}{Y_{i,t}}\right) = \alpha + \beta \ln Y_{i,t} + \varepsilon_i$$

This chapter takes the regional economic absolute convergence equation as the starting point for analyzing the problem. The specific equations are as follows:

$$\ln\left(\frac{Y_{i,t+k}}{Y_{i,t}}\right) = \alpha + \beta \ln Y_{i,t} + \rho W \ln\left(\frac{Y_{i,t+k}}{Y_{i,t}}\right) + \varepsilon_i$$

Among them,  $Y_i$  represents the actual budgeted education expenditure in year  $t$  of the  $i$ -th region, and  $Y_{i+k}$  represents the actual budgeted education expenditure in the  $i$ -k year of the  $i$  region.  $i = 1, 2, \dots, 38$ ;  $t = 2010, 2007, \dots, 2017$ . If the estimated coefficient in the first formula is less than 0, it means that there is convergence in the education budget  $i$  to  $i + k$  within the budget of various districts and counties in Chongqing, that is, the education financial growth in backward areas is faster than in developed areas, otherwise it will be rejected. Hypothesis. Each year in this article is a time period, so after introducing spatial autocorrelation factors, the spatial lag model is as follows:

$$\ln\left(\frac{Y_{i,t+k}}{Y_{i,t}}\right) = \alpha + \beta \ln Y_{i,t} + \varepsilon_i \quad \varepsilon_i = \lambda W \varepsilon_i + \mu_i$$

The spatial error model is as follows:

Among them,  $W$  is a spatial weight matrix. The weight between geographically adjacent districts and counties is 1, and those without borders are 0.

#### 4.2 Empirical Analysis of Spatial Econometric Model

First, the data source. This chapter uses the education budget data of 38 districts and counties in Chongqing from 2010 to 2017. Education financial data comes from “Chongqing Statistical Yearbook 2018”, this section mainly uses SPSS13 software.

Second, the budget for education in Chongqing. Judging from the size of Moran’s  $I$  value, since 2010, it is basically in an increasing trend. All these indicate that the regional dependence is becoming stronger and stronger for the allocation of financial resources for high school education.



**Table 2. Chongqing Municipal Education Financial Resources Geographic Spatial Correlation Test**

Year	2010	2011	2012	2013	2014	2015	2016	2017
Moran's I	0.1163	0.1892	0.2157	0.2094	0.2217	0.2301	0.2246	0.2402
P-Value	0.0831	0.0315	0.0201	0.0243	0.0254	0.0248	0.0261	0.0274

According to Table 2, from the point of view of the convergence coefficient, some periods appear to be divergent, while other periods are convergent. This shows that overall, the regional gap in the allocation of financial resources for education in high school is narrowing, but there may be a short-term divergence in individual time periods.

In summary, by analyzing the ways and means of compulsory education resource allocation and the basic elements of the total demand for compulsory education resources. The results of the total demand for compulsory education resources obtained show that the impact of GDP per capita and per capita living area on the total demand for compulsory education resources is positive and significant, while the impact of the minority population ratio is negative and significant. Due to different needs, compulsory education resources must be allocated according to demand according to the principle of supply and demand in order to obtain efficiency, so there will naturally be a situation of unbalanced allocation. This allocation method is in line with the principle of efficiency in compulsory education resource allocation, but it conflicts with the goal of education equity. In the process of resource allocation for compulsory education, we need to balance efficiency and fairness.

The government has achieved the desired effect by regulating the balanced allocation of basic education financial resources through education finance means. Convergence is dominant, and the difference in education financial resources in different regions is narrowing. In addition, there are significant spatial autocorrelations in the process of compulsory education resource allocation at different levels, that is, the allocation of education financial resources in neighboring areas will affect each other, thereby forming a regional aggregation effect. The existence of such spatial autocorrelation exacerbates the convergence of the allocation of education financial resources.

## 5. Conclusion

This paper studies the non-equilibrium allocation of compulsory education resources in Chongqing, and finds that there are obvious regional aggregation effects in Chongqing's compulsory education resources allocation in 2017, which are mainly divided into four aggregation forms: HH area has 8 districts, LL area There are 7 districts and counties, 5 districts and counties in the LH area, and 4 districts and counties in the HL area. There are no spatial dependencies between the 14 districts and counties and neighboring districts and counties.

Studies have shown that the impact of Chongqing's compulsory education resource allocation is characterized by diffusion, concentration, or multi-core. There are obvious differences in the compulsory education resource allocation in different regions, and there is an imbalanced situation of "the rich get richer, the poor get poorer". The main reasons are as follows: First, the different natural conditions, historical basis, cultural differences, economic differences and other objective reasons in different regions; Second, the institutional and policy reasons of the central government, provincial government, and local governments; the third is The spillover effect of major factors such as economy, finance and population on the allocation of compulsory education resources. Therefore, to explore the optimal allocation of Chongqing's compulsory education resources requires the use of multi-scale spatial analysis methods and can provide us with more information and useful analytical perspectives, and provides an important theoretical basis for proposing a balanced policy for the development of Chongqing's compulsory education resources.

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